

EEL702: Minor II

October 9, 2014

Maximum Marks: 15

1. Consider the grammar

$$E \rightarrow E \text{ or } T \mid T$$
$$T \rightarrow T \text{ and } F \mid F$$
$$F \rightarrow \text{not } F \mid (E) \mid \text{true} \mid \text{false}$$

- (a) Draw a parse tree for the sentence *not (true or false)*. [1]
 - (b) Show that this grammar generates all Boolean expressions. [2]
 - (c) Attempt to construct a nonrecursive predictive parser for this grammar. Follow the standard procedure discussed in class: modifying the grammar (if required) to left factor it and remove left recursion; obtaining the FIRST and FOLLOW sets for the non-terminals; constructing the parsing table. Show all working clearly. Is this grammar LL(1)? [4]
 - (d) Is this grammar ambiguous? Why or why not? [2]
 - (e) Augment the above grammar with a set of semantic rules, making use of synthesised attributes, in order to evaluate the truth value of the expression being parsed. Use your rules to construct an annotated parse tree for the input sentence of part (a). [2]
2. Give a CFG corresponding to each of the following languages. Also state if the language is regular or not, with justification.
 - (a) All binary strings not containing the substring 0001. [1.5]
 - (b) All strings over the alphabet $\{a, b, c\}$ that are of the form \mathbf{xy} , where \mathbf{x} and \mathbf{y} are non-identical strings of the same length. [2.5]